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## (54) Multiple display apparatus

(57) The invention provides display apparatus in the form of a cabinet 10. Upper and lower chambers 16, 18 and a main chamber 20 are defined within the cabinet by partitions 12, 14. A plurality of parallel display segments 24 are arranged inside the main chamber 20 and attached to transport means located in the upper and lower chambers 16, 18. The means are driven by a motor 42, common drive shaft 44, worms 461, 462 etc. The upper transport means includes a plurality of glides arranged to run inside a rack and connected to upper ends of respective display segments. The glides are moved around the track by a drive arm such that the segments 24 are successively moved from a first display position (1A, 2A, 3A etc) for one side of the segments D1L to a second display position (1B, 2B, 3B etc) for its other side. Preferably second transport means including an arm 88 engaging similarly with guide pins 84 and driven synchronously by a vertical shaft 92 is provided in the lower chamber to aid perpendicular alignment of the display segments 24. The display segments 24 may be viewed either from the front or the back if there is a rearward track part and associated transfer provision similar to that at the forward part. The glides may be held at the display plane by one or more resilient detents provided to engage with lugs arranged within or on the track. The display segments 24 may take the form of slat-like elements which may include a separate message element releasably attached thereto.

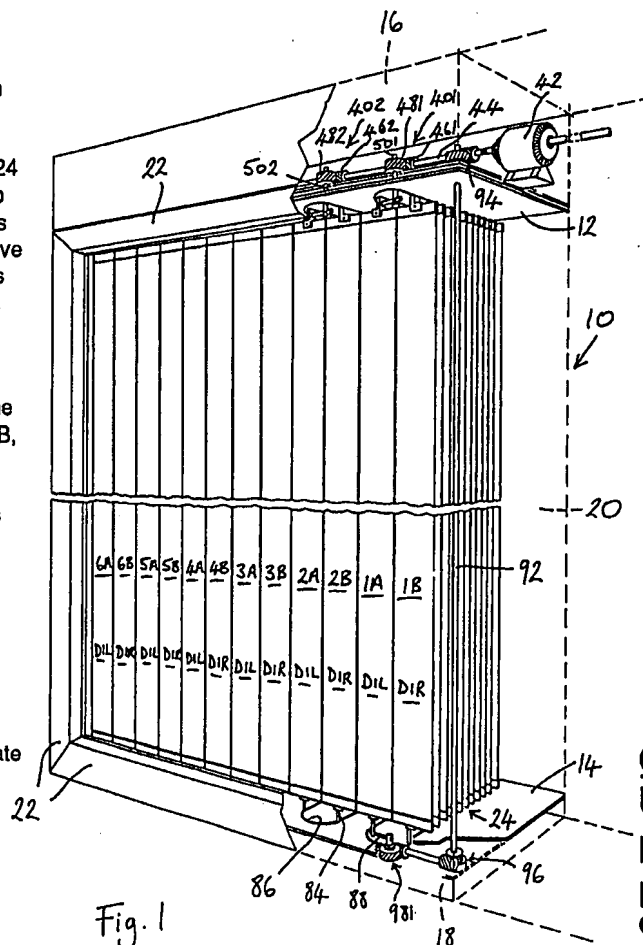


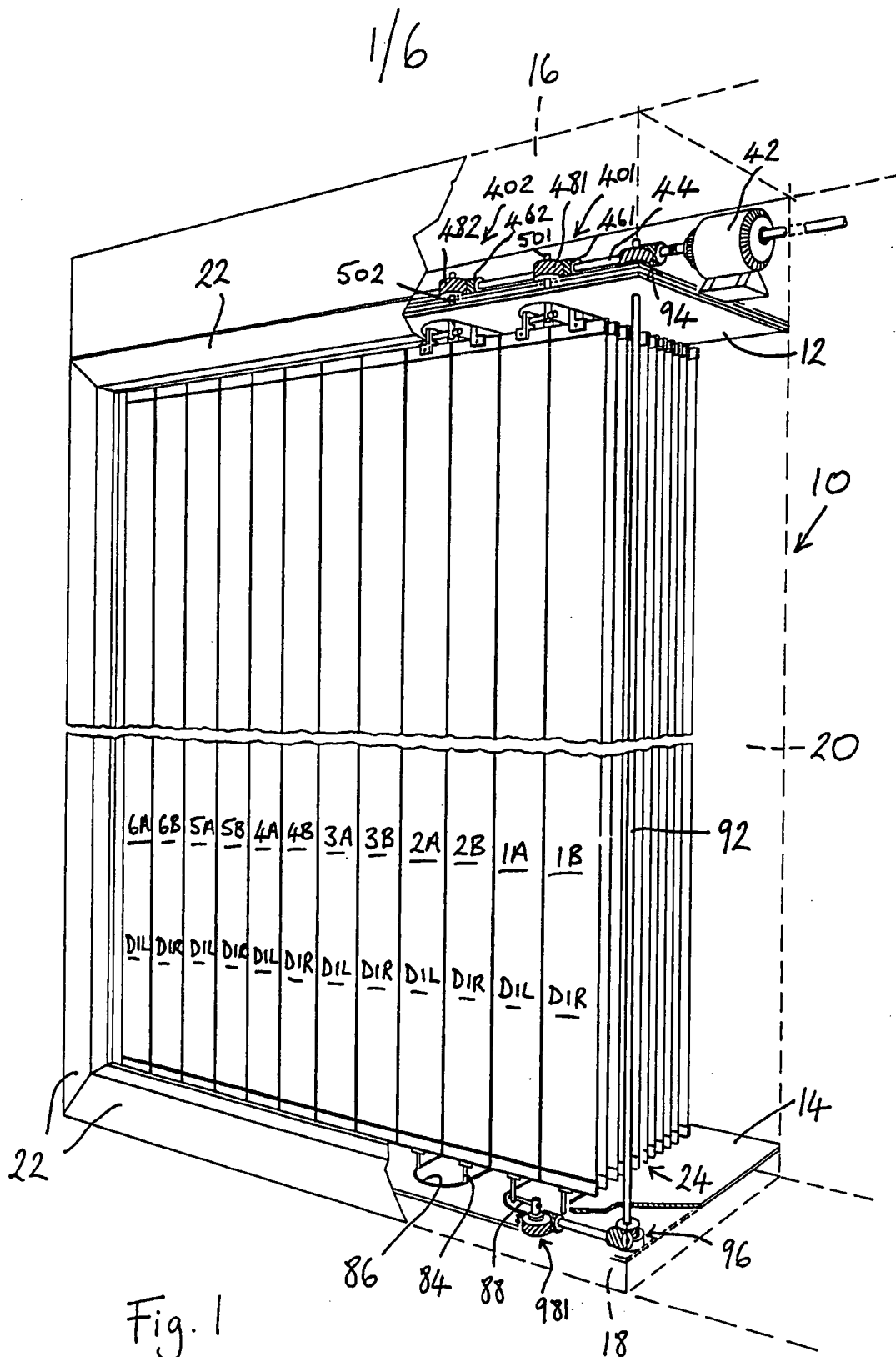
Fig. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

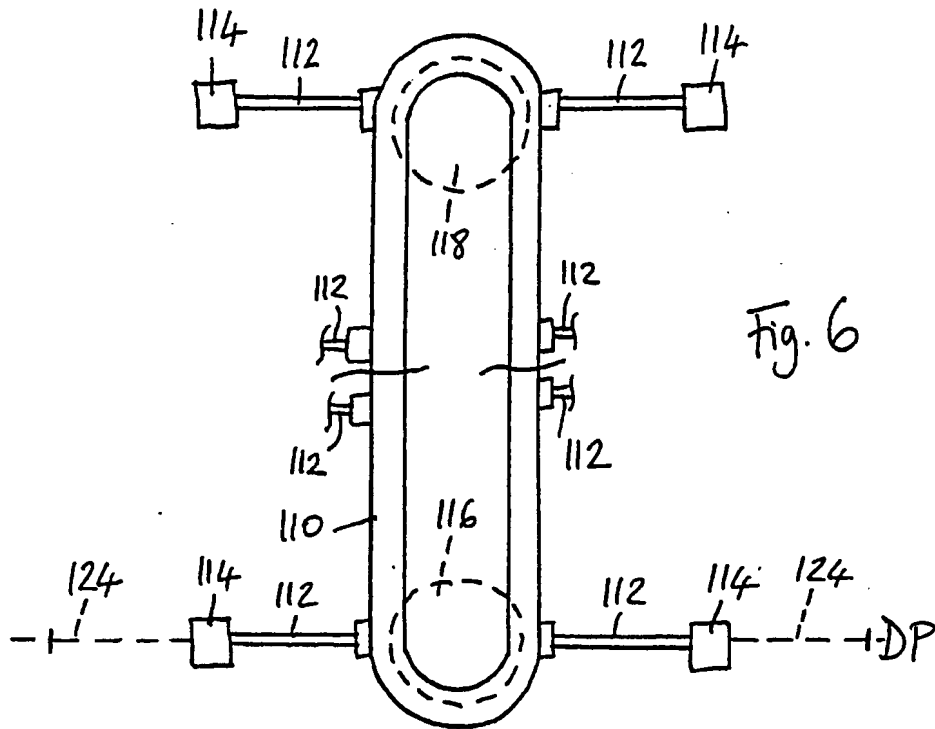
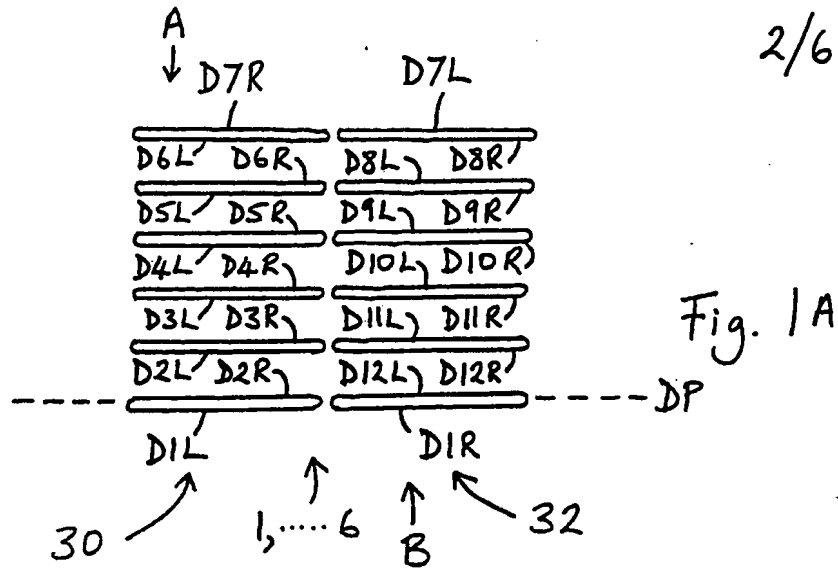
The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

This print incorporates corrections made under Section 117(1) of the Patents Act 1977.

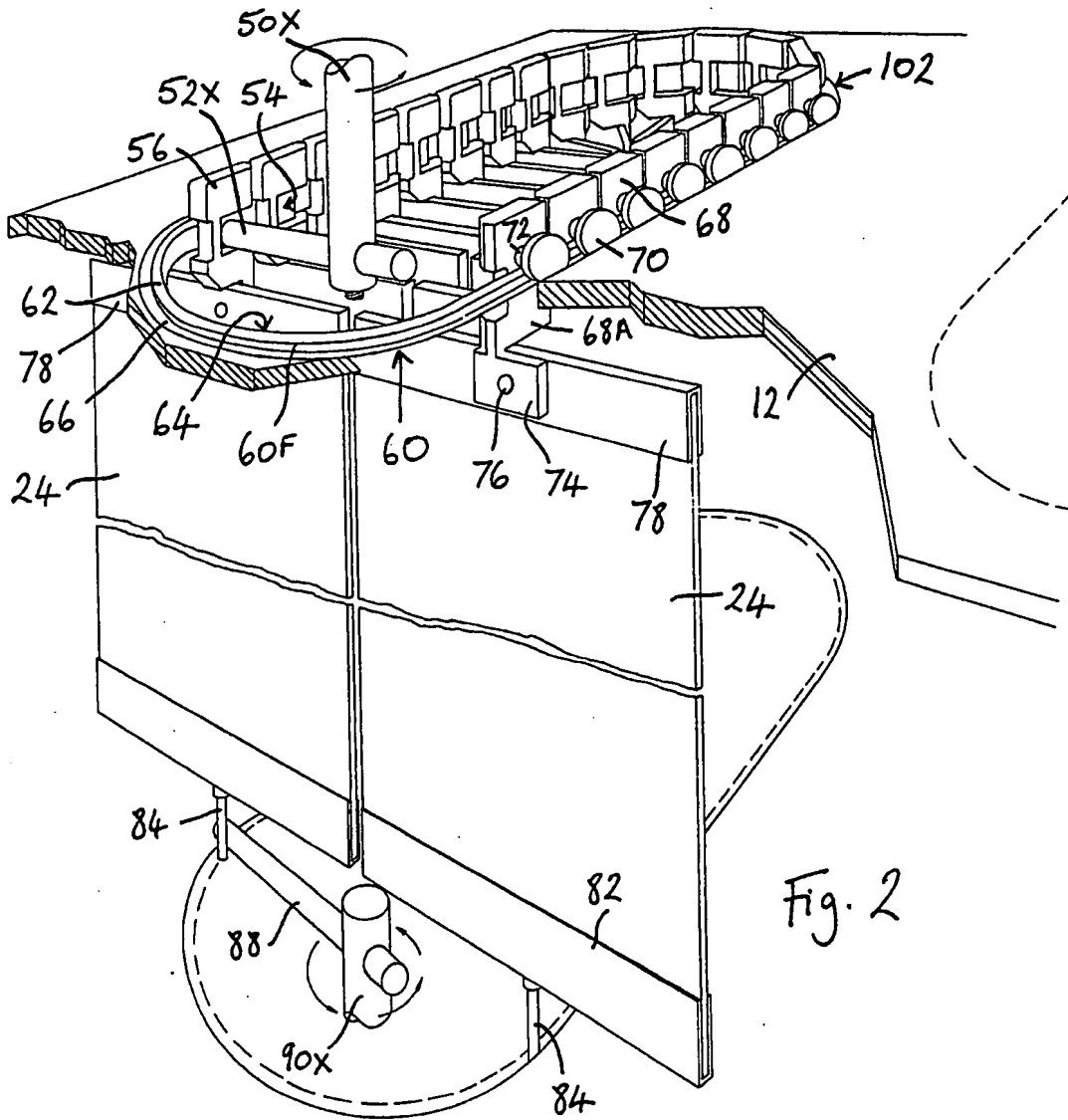
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Fig. 2A

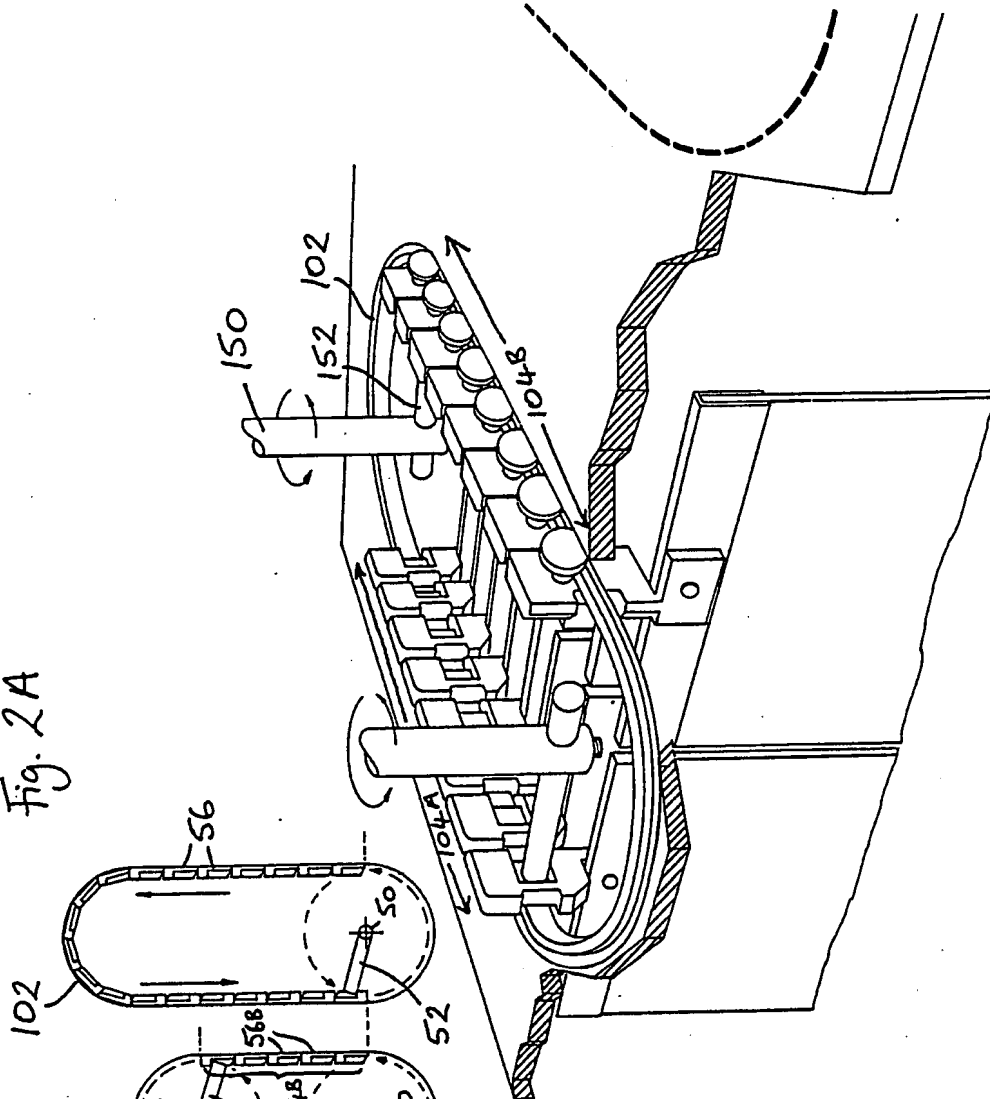
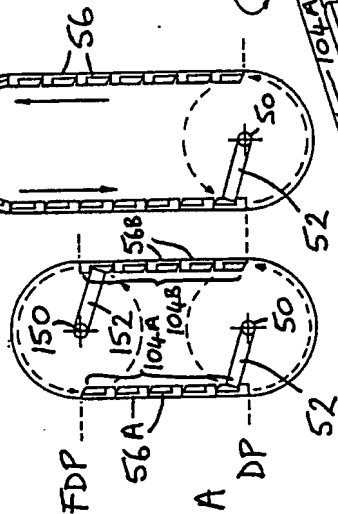


Fig. 3A



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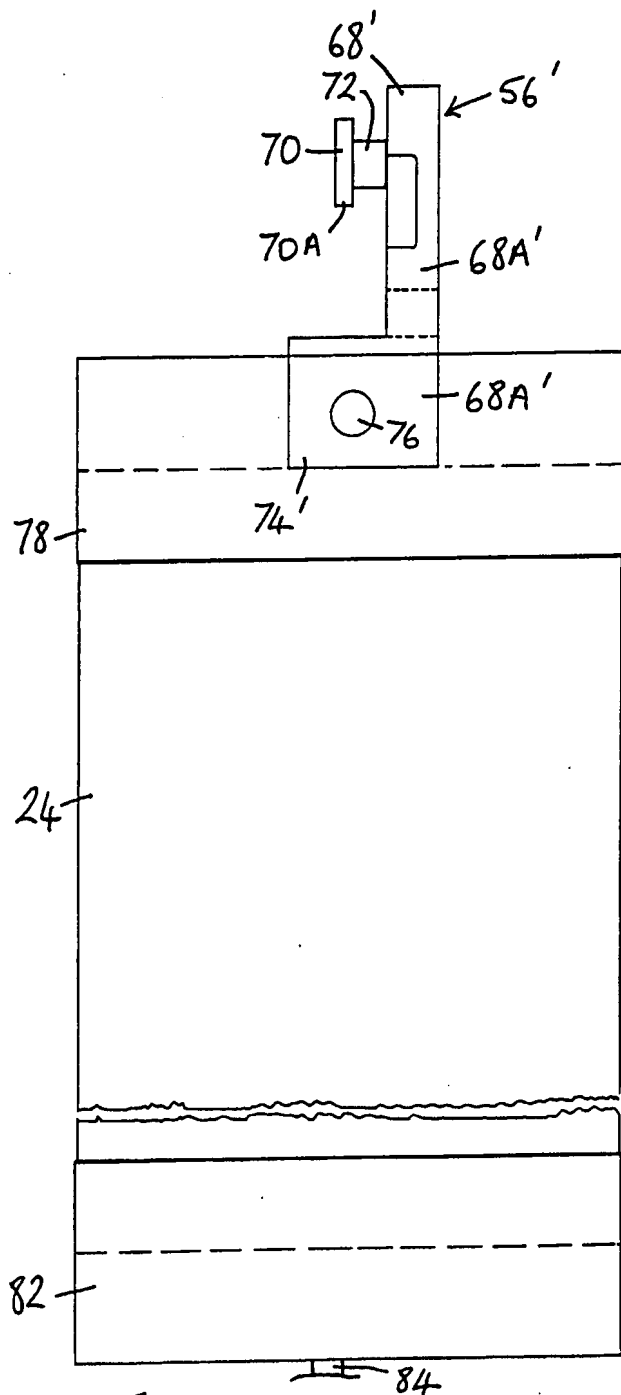


Fig. 4

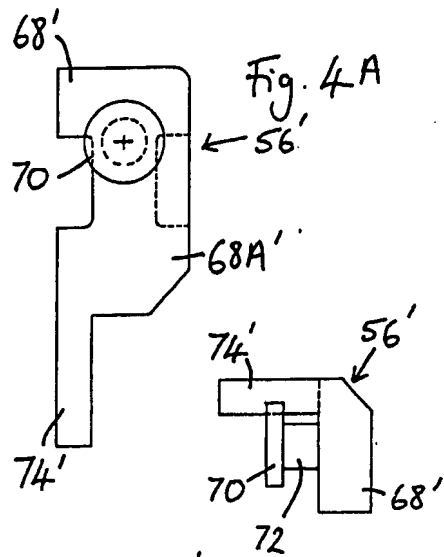


Fig. 4A

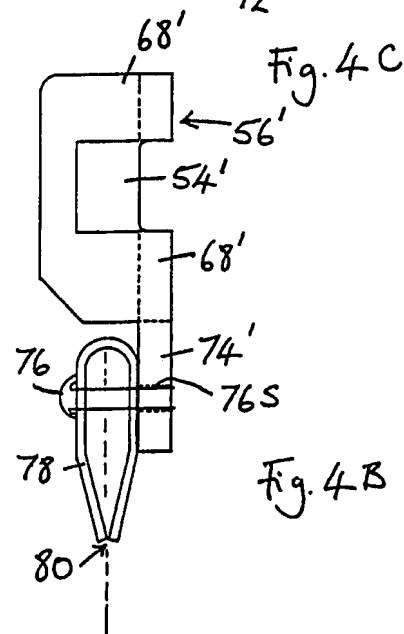


Fig. 4C

Fig. 4B

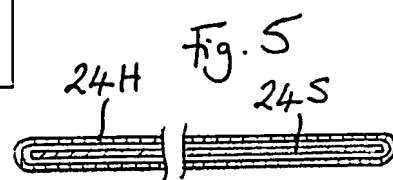


Fig. 5

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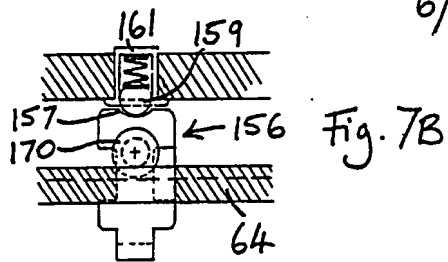


Fig. 7B

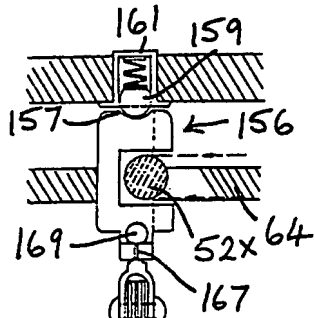


Fig. 7A

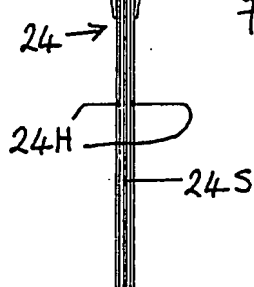


Fig. 8A

Fig. 8B

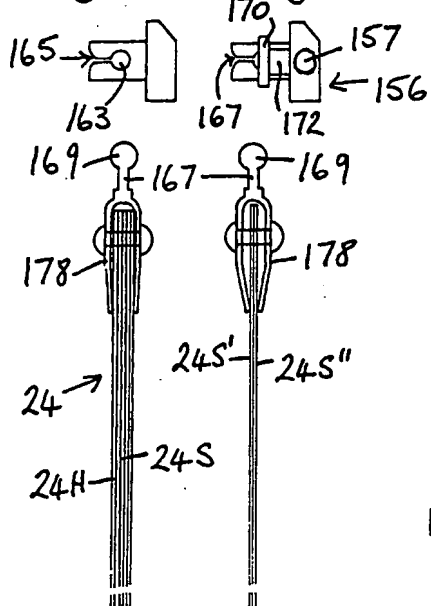


Fig. 9A

Fig. 9B

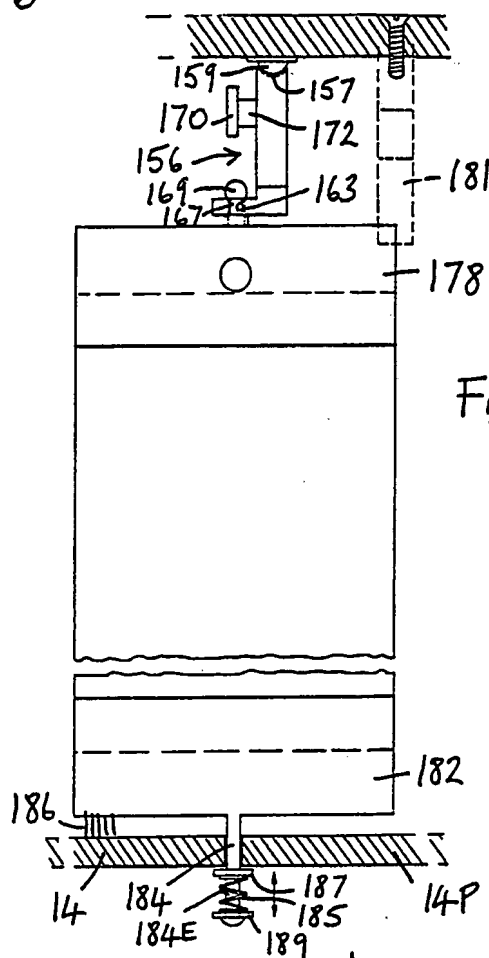


Fig. 7

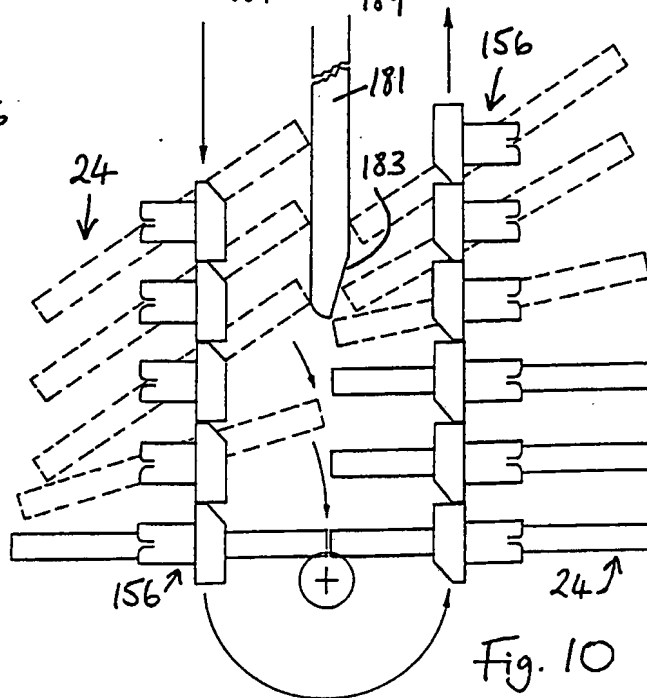


Fig. 10

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MULTIPLE DISPLAY DEVICE

This invention relates to displays, particularly to apparatus affording variety of what is displayed and achieving same by predominantly mechanical agency.

Origins of this invention lie in considering limitations of known essentially mechanical display apparatus used for multiple display purposes in advertising. A simple and widely used apparatus comprises parallel display elements rotatable about their axes to produce segments of each display. The display elements are normally of triangular section typically with display segments of three different displays on corresponding different ones of their faces. At least for a flat planar display plane, no more than three different displays can be achieved using rotational elements without losing close edge-to-edge adjacency of the segments.

Alternative advertising display apparatus is known offering more displays by way of flexible sheet material, usually one sheet per complete display, or feasibly with continuous sheet bearing successive displays. However, transitions are relatively slow as each display must clear the display area bodily before the whole of another display is visible, and too much time is spent showing parts of last and next displays together.

Other display apparatus with plural displays is also known, as used for displaying alternative lines of



information separated by non-display divisions, often typically also parts of each line separately from others, such parts further being separated by non-display divisions. Each of alternative lines or line parts has two segments represented by leaves hinged, typically held by pins, at edges to circular drums or rings. The way plural leaves are hinged to the same drums or rings, and hang therefrom, leads to one or more undisplayed leaves having an edge portion preventing close alignment between pairs of leaves and requiring to be hidden by non-display divisions between display lines.

It is an object of this invention to mitigate one or more of the foregoing limitations.

According to one aspect of this invention there is provided display apparatus comprising, for at least part of each of plural displays, two parallel display segments or supports therefor and associated transport means for presenting those segments with their edges adjacent, the transport means engaging all of the display segments or supports at or near ends thereof and serving to move the segments or supports successively from a first display position for one side of the segment concerned in front of and registering with the corresponding segment to be displayed for the next display, to a second display position for its other side in front of and registering with the corresponding segment for the immediately previous display, said two parallel display segments for each display being on the one and the other sides of succeeding said segments or supports.

The first and second display positions may be defined and the display segments or supports temporarily located thereat by suitable detent means, preferably of a type readily overcome by drive applied to the segments or supports.

Using two-sided said display segments, each will carry, on opposite side, part of what is to be displayed for two succeeding displays, and, before display, the parts for the same display will be confronting each other as the two-sided segments come to the first position and leave the second position. An even number of two-sided display segments can thus be used for the same number of different displays to be presented successively.

A suitable transport path for ends of the segments or supports has a forward part taking each in succession in front of co-planar said first and second display positions, in transfer between those positions, and such forward path part may conveniently be semicircular to secure movement through 180°. Rather than just being completely circular, the transport path as a whole preferably has further side parts extending from ends of its front part, conveniently in straight and parallel relation so that the display segments or supports can successively approach and leave the first and second display positions wholly in registration with succeeding and preceding segments or supports, respectively, and move from the first to the second display position without interference or collision. Such arrangement allows the number of available displays to be a matter of choice governed mainly by the lengths of

said side parts, and simplifies provisions, such as tapering down, otherwise called for to deal with competition for space or interference with accurate alignment at the centre of a circular overall transport path. It also permits displays that are each made up entirely of two parallel display segments to be viewed either from front or back, at least if there is a rearward track part and associated transfer provision similar to that for said forward part. In addition provision is facilitated of displays made up of many more than two parallel display segments, in fact multiples thereof each with its own associated said transport means, to achieve (at display) substantial edge-to-edge adjacency throughout the segments of each display, and contributes to a second aspect of this invention.

Such edge-to-edge adjacency can be aided by removal of any requirement or desirability for clearance between display segments or supports on their way to and from the first and second positions along parallel straight lengths of transport path. Doing so need involve no more than guide means to tilt the display segments or supports as they leave the second position to make an angle transversely of the direction of travel, which may be maintained for movement towards the first position, but released or positively returned at or prior to reaching the first position.

According to that second aspect of this invention, there is provided display apparatus comprising, for plural displays, a plurality of sets of pairs of parallel display segments or supports therefor,

and plural transport means one for each said set, each transport means bringing each related said pair of parallel display segments to first and second display positions, respectively, with outer edges of its pair of segments closely adjacent outer edges of next said pairs of parallel display segments, conveniently along parallel transport path parts that are substantially straight towards and away from said first and second display positions and perpendicular to a common plane for all the display positions.

Suitable transport means may provide said transport paths in various ways, all preferably of endless configuration, including static track-defining formations such as grooves, upstanding ribs, rails, or some combination thereof, and associated track traversing means connected to ends of the display segments or supports, to act as carriers therefor, with sliding and/or rolling track engagement generally after the manner of glides. Such glides can then form end-to-end abutting trains to and from said first and second display positions, and, if as a single continuous train behind those positions, can usefully contribute to shunting action that preserves co-planar relation of those positions as each segment or support arrives at its second display position. A rotating positive displacement arm or wheel can be used to engage the glides and transfer them from first to second display positions. An alternative glide drive could be of arcuate reciprocating type. There could, of course, be dummy or spacer glides or equivalent between those that carry display segments, at least if moved in front of carrier glides from the first to the second position.

In a preferred embodiment of the invention the glides are arranged to locate within a C-shaped track, each glide being advantageously provided with one or more ball bearing assemblies locating within said track. In order to ensure that the glides are held at the display plane one or more resilient detents are provided to engage with lugs arranged within or on the track. Thus the glide can be held in a specific position by interengagement of the detents and the lugs until the displacement arm engages the glide to transfer it from its first to second display position or until a further glide is moved into engagement with the lugs.

The display segments are preferably a slat like member and are advantageously substantially rigid for ease of use when in a vertical or horizontal alignment. In a preferred embodiment the segments are substantially hollow with internally provided spacing walls. In order to allow the alteration of a message carried on the segment there is advantageously provided a separate message element releasably attached thereto. To accommodate such an element the segment may be provided on one or each planar surface with one or more track guides such that a message element may be slideably located therebetween.

Moreover, at least with significant lengths of parallel transport path parts, and for displays extending only over two parallel segments, similar and coordinated transport means at a return rearwardly of the first and second display positions enables similar displays on a front and rear viewing basis, as can be particularly advantageous, and is not usually achievable for prior systems other than by providing two display units back to back.

For display apparatus with its said display segments or supports vertical, they can be suspended from the track, say attached centrally of their widths and immediately below the track. At least guidance is preferred for bottoms of the display segments or supports, often and advantageously synchronised bottom drive by way of corresponding bottom transport means. It can further be advantageous to apply tensioning to display segments or supports therefor, particularly for display segments held only at tops and bottoms. Doing so is readily achieved using spring loading at their bottoms.

Alternatively, the transport paths may be defined by elongate flexible drive means such as chains or belts having attachments spaced therealong for connections to the display segments or holders. Interestingly, such provision can operate on a simple indexed basis to provide successive displays by utilising offsets of actual connections to display segments or supports to each side of the drive means and spacing of connections to the drive means to correspond with movement of the display segments or supports from their first to their

second display positions. Similar results can, of course, be achieved using a continuously abutting set of disconnected members, which may be like the aforesaid glides, on a track. However, endless flexible drives, which could include chains made up of successively connected elements like the aforesaid glides, offer the advantage of not requiring provision of a track to run along. Two-sided display capability is, of course, then implicit for two-segment displays. Moreover, transport provisions of this nature are particularly well suited to use with horizontal display segments or supports extending between synchronised pairs of transport means.

Use of separate transport means for sets of pairs of display segments means that coordination of operations of the transport means is required for simultaneously changing whole displays, and that is readily achieved mechanically by a common drive system, say a common shaft with spaced drive worms. However, it is equally possible to provide for separate control of the transport means, or for coordinated control of groups of transport means representing less than the whole of a display, in which cases corresponding display segments can be changed independently of others.

Specific implementation for this invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an incomplete perspective view of one embodiment;

Figure 1A is a diagram aiding explanation of arrangement of segments of successive displays;

Figure 2 is a detail perspective view showing upper and lower transport means;

Figure 2A is a plan diagram corresponding to one transport means of Figure 2;

Figure 3 is another detail perspective view showing front and rear transport means;

Figure 3A is a plan diagram corresponding to the transport means of Figure 3;

Figure 4 is a front view of a display segment holder and one embodiment of glide;

Figures 4A,B and C are side, end and top views of the slide of Figure 4;

Figure 5 is a section through a preferred display segment support;

Figure 6 is a plan view of a variant transport mechanism;

Figures 7, 7A and 7B are incomplete front and side sectional views for suspended display segments;

Figures 8A,B are plan top and bottom views of a glide;

Figures 9A,B are diagrammatic views for display segments; and

Figure 10 is a diagrammatic plan view for tilting of moving display segments or supports.

In the drawings, Figure 1 shows a typical cuboid cabinet 10 with upper and lower partitions 12 and 14, respectively, defining upper and lower chambers 16 and 18, respectively, and a main chamber 20 that is open to the front within framing 22.

The framing 22 is immediately in front of a display plane and constitutes a window for viewing



parallel display segments or supports therefor 24 shown extending vertically. Frontmost ones of the display segments 24 carry further references 1A,B...6A,B indicating membership of sets 1,...6, each with changing subsets 'A' and 'B' according to whether the display segments concerned are coming forward to the display plane or going away from it. In addition, the display segments have further references D1L, D1R etc applied representing left and right portions of parts of one display (D1).

Figure 1A illustrates how left and right portions of successive displays D1,...D12 are organised for each of twelve-segment sets 1,...6. Consecutive display segments coming forward, i.e. subsets 'A', have portions of parts, actually halves, of displays still to reach the display plane DP on confronting faces of consecutive segments. For succeeding displays, D2 being next, as shown, the display segments of one subset 'A' advance by one unit corresponding to spacings between them, and those of the other subset 'B' retreat by one such unit, both while the 'A' segment is rotated from first display position 30 showing portion D1L to second display position 32, so that the display changes to show portion D2R alongside portion D2L. At the same time, unless there is a semicircle of segments between D7L and D7R, the segment bearing D7L/D8R will be rotated from subset 'B' to subset 'A'; but, in any event one two-sided segment or holder therefor will leave the top-most illustrated position of the 'B' subset and one will join the 'A' subset, and that action can conveniently be the mechanism for pushing the next segment of subset 'A' into the display plane DP.

There are individual upper transport mechanisms 401,402 etc for each of the sets 1,2 etc of display segments or supports 24, and operative to achieve movements of display segments relative to the display plane DP. Figure 1 shows those transport mechanisms 401 etc driven in common by a motor 42, common driven shaft 44, worms 461,462 etc and wheels 481,482 etc driving shafts 501,502 etc.

Turning to Figure 2, one driven shaft 50X is shown equipped with a radial drive arm 52X to engage recesses 54 in glides 56 following a straight-sided oval track 60 shown comprising an upstanding rib 62 about an oval aperture 64 in the upper portion 12 and a groove 66 about the rib 64. The glides 56, see also Figure 4 and Figures 4A-C, have a part 68 inside the track 60 and a wheel 70 running in the groove 66, the wheel being spaced from the part 68 by wheel bearing stud 72 above the rail 62. The glide part 68 extends downwardly at 68A below the track 60 and the upper portion 12 to a transverse wing formation 74 having a locator 76 for a display segment or support holder 78 from which the display segment or support 24 hangs down. The locator 76 is shown as an elongate screw-action device cooperating with threading 76S in the wing 74 after passing through U-shaped holder 78 of resilient material having a converging gripper mouth 80 for the display segment or support 24. An alternative would be a snap-action device, for example of releasable "pop-stud" type. Dashed items in Figures 4A,B,C refer to parts similar to but not identical with correspondingly referenced parts in Figures 2 and 4.

The depending glide part 68A and the wheel 70 cooperate with sides of the track rib 62 for glide locator purposes. Additionally, however, the locator 76 is shown disposed centrally of the top of the display segment or support 24 and holder 78, and vertically below the inner edge 70A of the wheel 70.

Figure 4 also shows a lower gripper 82 for the display segments or holders 24. The lower gripper 82 may be generally similar to the upper holder 78, but is shown with a downwardly extending pin 84 for purposes to be described shortly.

An advantageous display segment support, see Figure 5, comprises a flat tube 24H of transparent material containing a replaceable double-sided actual display sheet 24S, or two single-sided sheets back-to-back.

Reverting to Figures 2 and 2A, a continuous train of glides 56 is shown in end-to-end touching relationship, from the second display position 32 going rearwardly all the way round to the first display position 30. The lengths of the glides 56 then determine spacings of the display segments 24, but dummy sliding elements could be interposed between carrier glides if desired. Transfer of one carrier glide from the first position 30 to the second position 32 by the arm 52, over semicircular forward track part 60F, and with any dummy element in front of it, can have an overall shunting action required for successive displays to occupy the display plane DP. Accuracy of location in the display plane DP can be aided by temporary stop or

locating means whether of extensible and retractable type or as flexible brushes, and whether at top or bottom or both.

In addition, Figure 1 shows apertures 86 in the lower partition 14 that may register with apertures 64 in the upper partition 12 and serve for prescribing inner guidance edges for guide pins 84 depending from the display segments or supports 24. Advantageously, and usefully in aiding maintenance of perpendicular alignments of the display segments, those guide pins 84 are driven synchronously with the glides 56 by arm 88 and shaft 90 by way of a drive taken from shaft 44 by way of vertical shaft 92, and worm-and-wheel provisions 94, 96 and 98 (only one of the latter subscripted '1' being shown in Figure 1).

Turning to Figures 3 and 3A, the difference compared with Figures 2 and 2A is that the glides 56 are moved between two trains 56A and 56B respectively approaching and going away from the first and second display positions 30 and 32, respectively, and there are second drive shafts 150 and 152 for traversing the rear bend 102. The result is an arrangement with a further display plane FDP permitting two-way displays for a single transfer mechanism. The shafts 50 and 152 will be interlocked to move simultaneously.

It will be appreciated that Figure 3 systems have fewer displays than Figure 2 systems for the same depth of cabinet. For Figure 3 systems, the entire repertoire of displays is decided by lengths of straight track parts 104A,B extending between forward and rear

transport track parts. For Figure 2 systems, it is feasible to have no such straight track parts 104A,B so long as congestion and jostling of display segments or supports centrally was not a problem. Incidence of such problems would be reduced by chamfering inner edges of the display segments or supports 24, and further reduced by at least short straight track parts, say equivalent to one glide length as a minimum.

It will also be appreciated that both of the Figures 2 and 3 systems will work with a continuous drive for the transport mechanisms, there then preferably being a display interval between pick-up and release of successive display segments or supports at the first and second display positions 30 and 32. However, intermittent drive with dwells between each release and next pick up may be preferred, in order to give more than 50% full display time in each display cycle.

Turning to Figure 6, a system best suited by intermittent drive comprises an endless flexible carrier 110 for arms 112 extending outwardly therefrom, to supports 114 for display segments or supports 124. The endless carrier 110 is driven intermittently by one or other or both of wheels 116,118. Lengths of the arms 112 and their spacings 112 along the endless carrier 110 are such that consecutive display segments or supports 24 will occupy the common display plane DP. Chain-and-sprocket or toothed-wheel-and-belt systems are suitable for the carrier 110 and wheels 116,118.

The system of Figure 6 is also particularly well

suited to driving displays with their driven segments extending horizontally rather than vertically and with transport mechanisms at both ends, though systems of Figures 2 and 3 could be so applied.

Many variations are feasible, for example, the arms 52 could be replaced by toothed wheels or the glides 56 equipped with protrusions to coact with variant drive arms or wheels. Also, the track 60 and glides can be of any type and configuration suiting the purpose, including as rails with channel formations taking parts of the glides, or vice versa, i.e. the glides returned C section, say with adjustable jaw in provisions for removal and replacement. Moreover, drive means could be otherwise, including individual drive motors, say of electric stepper type, with appropriate synchronising and or selective control means.

Turning to Figures 7 to 9, glides 156 are shown with two further features, One is top depression 157 shown for engagement by ball 159 of ball catch 161 mounted in an upper plate above the track 164. Ball catches such as 161 provided at the first and second positions for display help assure the segments or supports 24 are accurately located on the display plane. The other is snap-fitting in hole 163 beyond bifurcation 165 for neck 167 below head 169 of the holder 178 with the neck 167 rotatable in the hole 163 as will shortly be described. The holder 178 is shown both as a two sided display segment sheet 24S within a flat tube holder 24 (Figure 9A) and simply as two sheets 24S' and 24S'' bonded together (Figure 9B). It will be appreciated that, if desired, such bonding together

could be by way of an intermediate carrier sheet (not shown).

Figures 7 and 10 show tilting of the display segments or supports 24 going away from the second display position and on their return towards the first display position. Such tilting is achieved by a central guide 181 depending from the upper plate and having a tapered leading edge 183 to produce arcuate rotation of the holder 178 at their necks 167 in glide holes 163. Return from such tilting can be assisted by light brushes 185 at the first and second display positions, say extending upwards from the bottom plate 14.

At least light tensioning of light weight sheets, such as that of Figure 9B, can be provided for, see Figure 7 for extension 184E of guide pin 184 and spring 185 acting between washers 187,189. It will, of course, be appreciated that central plate part 14P will be separate and need support from below if present.

In an alternative embodiment of the invention the glides are provided by a three part unit comprising a body part having means for engagement with the arm of a pick-up cam and a top and bottom part each provided with one or more rotatably mounted ball bearings and at least one resilient detent means. The glide is arranged to be displaceable around a C-shaped glide track having a plan substantially as illustrated in Fig. 3A. In this respect the ball bearings serve to carry the glides and provide minimal frictional losses. A plurality of lugs are provided around the track so as to engage the detent means when a display segment carried by the glide is substantially located in its display plane DP.

The glide track is provided with two pick-up cams, each with a projecting arm, and connected mechanically so as to rotate sequentially and transfer glides from one side of the track to the other. To provide positive tracking of the glides around the track a groove is provided respectively in the tracks upper and lower surfaces so as to accommodate the ball bearings therein. The body part of the glide is provided with a horizontally extending arm which carries at its free end a vertically depending segment carrier. Preferably the display segments are hollow in cross-section and the segment carrier is arranged to be inserted in one end thereof. Securement of the carrier in the segment is by way of a pin or by frictional engagement.

The display segments are formed as a hollow profile to reduce the overall weight of the construction and hence the frictional drag of the glides around the



track. To ensure that the segments are sufficiently rigid internal bracing walls are provided between opposed planar surfaces. Additionally the segments are each provided with guide means at their peripheral edges which are arranged to retain and hold a message element against one or each surface of the segment. Thus the message elements are presented for display at the display plane as previously described.

The message elements are each releasably secured to their respective segment and can thus be removed for replacement or alteration of the message or display. The guide means may be provided with a frictional engagement with the message element i.e. by the provision of a resilient lip or the element can be held in place by pegs or similar means.

CLAIMS

1. Display apparatus comprising, for at least part of each of plural displays, two parallel display segments or supports therefor and associated transport means for presenting those segments with their edges adjacent, the transport means engaging all of the display segments or supports at or near ends thereof and serving to move the segments or supports successively from a first display position for one side of the segment concerned in front of and registering with the corresponding segment to be displayed for the next display, to a second display position for its other side in front of and registering with the corresponding segment for the immediately previous display, said two parallel display segments for each display being on the one and the other sides of succeeding said segments or supports.

2. Display apparatus comprising, for plural displays, a plurality of sets of pairs of parallel display segments or supports therefor, and plural transport means one for each said set, each transport means bringing each related said pair of parallel display segments to first and second display positions, respectively, with outer edges of its pair of segments closely adjacent outer edges of next said pairs of parallel display segments, conveniently along parallel transport path parts that are substantially straight towards and away from said first and second display positions and perpendicular to a common plane for all the display positions.

3. Display apparatus as claimed in claim 1 or claim 2 in which the first and second display positions are defined and the display segments or supports temporarily located thereat by detent means.

4. Display apparatus as claimed in claims 1, 2 or 3 in which a transport path for ends of the segments or supports has a forward part taking each in succession in front of co-planar

said first and second display positions, in transfer between those positions.

5. Display apparatus as claimed in claim 4 in which the forward path part is semicircular to secure movement through 180°.

6. Display apparatus as claimed in claims 4 or 5 in which the transport path as a whole, has further side parts extending from ends of its front part, in straight and parallel relation so that the display segments or supports can successively approach and leave the first and second display positions wholly in registration with succeeding and preceding segments or supports, respectively, and move from the first to the second display position without interference or collision.

7. Display apparatus as claimed in claim 6 comprising two parallel display segments to be viewed either from front or back, at least if there is a rearward track part and associated transfer provision similar to that for said forward part.

8. Display apparatus as claimed in any preceding claim further including guide means to hold the display segments or supports as they leave the second position to make an angle transversely of the direction of travel, which is released or positively returned at or prior to reaching the first position.

9. Display apparatus as claimed in claim 8 in which the transverse angle is maintained for movement towards the first position.

10. Display apparatus as claimed in any preceding claim in which the transport path is defined by a static track defining formation having associated track traversing means in the form of glides connected to ends of the display

segments or supports, to act as carriers therefor, with sliding and/or rolling track engagement,.

11. Display apparatus as claimed in claim 10 in which the glides form end-to-end abutting trains to and from said first and second display positions, and act to contribute, by a shunting action, to preserve co-planar relation of those positions as each segment or support arrives at its second display position.

12. Display apparatus as claimed in claim 10 or 11 in which a rotating positive displacement arm is used to engage the glides and transfer them from first to second display positions.

13. Display apparatus as claimed in any preceding claim in which glides are arranged to locate within a C-shaped track, each glide being provided with one or more ball bearing assemblies locating within said track.

14. Display apparatus as claimed in any of claims 10 to 13 in which the glides are held at the display plane by one or more resilient detents provided to engage with lugs arranged within or on the track.

15. Display apparatus as claimed in any preceding claim in which the display segments are of a slat-like member which is substantially rigid when in a vertical or horizontal alignment.

16. Display apparatus as claimed in claim 15 in which the segments are substantially hollow with internally provided spacing walls.

17. Display apparatus as claimed in claims 14, 15 or 16 in which the segment further includes a separate message element releasably attached thereto.

18. Display apparatus as claimed in claim 17 in which the segment is provided on one or each planar surface with one or more track guides such that the message element may be slideably located therebetween.

19. Display apparatus as claimed in any preceding claim in which the display segments or supports are arranged vertically suspended from the track, attached centrally of their widths and immediately below the track, and guidance means is provided for bottoms of the display segments or supports.

20. Display apparatus as claimed in claim 19 in which a synchronised bottom drive is provided.

21. Display apparatus as claimed in any preceding claim in which tensioning is applied to the display segments or supports therefor.

22. Display apparatus as claimed in claim 20 in which the tensioning is achieved using spring loading at the segments' bottoms.

23. Display apparatus as claimed in any of claims 1 to 9 in which the transport paths are defined by elongate flexible drive means having attachments spaced therealong for connections to the display segments or holders.

24. Display apparatus as claimed in claim 23 in which successive displays are provided by utilising offsets of actual connections to display segments or supports to each side of the drive means and spacing of connections to the drive means to correspond with movement of the display segments or supports from their first to their second display positions.

25. Display apparatus as claimed in claim 20 in which

synchronisation of operation of the transport means for simultaneously changing whole displays is achieved mechanically by a common drive shaft with spaced drive worms.

26. Display apparatus substantially as herein described with reference to and as shown in the accompanying drawings.

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**Patents Act 1977**  
**xaminer's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

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**Relevant Technical fields**

(i) UK Cl (Edition K ) G5C (CCA, CCB, CCC, CCD, CCE, CCF, CCG, CCH, CCJ, CCK, CCMA, CCMB)

(ii) Int Cl (Edition 5 ) G09F

**Databases (see over)**

(i) UK Patent Office

(ii)

**Search Examiner**

R A H CASLING

**Date of Search**

17 NOVEMBER 1992

Documents considered relevant following a search in respect of claims 1, 3 TO 26

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2067331 A (KRONE) see page 1 line 71 et seq	Claims 1, 3,5 at least
X	GB 951716 (PILLER) see whole document	Claims 1, 5,10,13, at least
X	US 4970814 (BRISCOE) see column 2 line 45 et seq and column 4 line 29 et seq	Claims 1, 6,15,17 at least
X	US 4688342 (BRONAUGH) see column 2 line 31 et seq column 5 line 55 et seq	Claims 1, 6,7,8,10, 11,14,15 at least
X	US 4005536 (FANNING) see column 2 line 52 et seq	Claims 1, 5,15 at least

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Category	Identity of document and relevant passages	Relevant to claim(s).

### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

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